Linnæus University

Dnr: 2019/3342–3.1.2.2

Course syllabus

Faculty of Technology

Department of Computer Science and Media Technology

4DV806 Avancerad informationsvisualisering och tillämpningar, 5 högskolepoäng

4DV806 Advanced Information Visualization and Applications, 5 credits

Main field of study
Computer Science

Subject Group
Informatics/Computer and Systems Sciences

Level of classification
Second Level

Progression
A1F

Date of Ratification
Approved by Faculty of Technology 2019-10-28
The course syllabus is valid from autumn semester 2020

Prerequisites

- 90 credits in Computer Science (including a degree project at Bachelor level).
- 5 hp information visualization on advanced level (e.g. 4DV805 or equivalent).
- English B/English 6 or the equivalent.

Objectives

Knowledge and understanding

- A.1 Define and explain visualization techniques (regarding interaction and visual representation) and example tools for special data sets and applications domains,
- A.2 describe validation and evaluation methods for information visualization tools and approaches, and
- A.3 describe the most important challenges in the field.

Skills and abilities

- B.1 Represent data by expressive and effective visualizations using state-of-the-art methods, software, and tools, and

- B.2 implement new interactive visualizations for more complex and larger data sets; where required with a focus on specific application domains or analysis problems.

Judgement and approach

- C.1 Critically reflect on the discussed visualization and interaction approaches in the light of current theories and research, and
- C.2 make well-grounded design choices in the context of various tasks and data constraints.

Content

The course extends the course Information Visualization with interactive visualization techniques and systems for special data sets, such as network data, time-dependent data, and text data. Furthermore, we discuss specific applications where information visualizations are used to analyze/explore domain-specific data—e.g., in bioinformatics, geography, software development, etc. The course also reviews possibilities on how visualizations can be validated, evaluated, or used in non-standard contexts like collaborative settings or personal data analysis. The following topics are covered:

- Visualization techniques and drawing conventions for trees/hierarchies, general network data (graphs), and multivariate/dynamic networks.
- Visualization techniques for text data and document collections (corpora).
- Visualization techniques for general time series data.
- Visualizations for specific application domains including an overview of their usual analysis tasks and data specifics.
- Collaborative and personal visualization ideas and approaches.
- Validating and evaluating visualizations.
- The most important unsolved information visualization challenges.

Type of Instruction

The instruction consists of lectures, seminars, and teacher-supervised laboratory sessions.

Examination

The examination of the course is divided as follows:

Code	Designation	Grade	Credits
2001	Programming project	AF	2,00
2002	Oral presentation	AF	1,00
2003	Oral exam	AF	2,00

The course is assessed with the grades A, B, C, D, E, Fx or F.

The grade A constitutes the highest grade on the scale and the remaining grades follow in descending order where the grade E is the lowest grade on the scale that will result in a pass. The grade F means that the student’s performance is assessed as fail (i.e. received the grade F).

Assessment of student performance is made through a programming project, an oral

presentation, and an oral exam. Repeat examination is offered in accordance with Local regulations for courses and examination at the first- and second-cycle level at Linnaeus University.

To pass the course, grade E or higher is required for all parts. The final grade is decided from: Programming project (40%) and Oral presentation (20%), and Oral exam (40%).

If the university has decided that a student is entitled to special pedagogical support due to a disability, the examiner has the right to give a customized exam or to have the student conduct the exam in an alternative way.

Objectives achievement

The examination elements are linked to the course objectives in the following ways:

Goal	2001	2002	2003
A.1		☑	☑
A.2	☑		☑
A.3	☑		☑
B.1	☑		
B.2	☑		
C.1	☑	☑	☑
C.2	☑		☑

Course Evaluation

During the implementation of the course or in close conjunction with the course, a course evaluation is to be carried out. Results and analysis of the course evaluation are to be promptly presented as feedback to the students who have completed the course. Students who participate during the next course instance receive feedback at the start of the course. The course evaluation is to be carried out anonymously.

Credit Overlap

The course cannot be included in a degree along with the following course/courses of which the content fully, or partly, corresponds to the content of this course: 4DV801 5 credits

Other

Grade criteria for the A–F scale are communicated to the student through a special document. The student is to be informed about the grade criteria for the course by the start of the course at the latest.

The course is conducted in such a way that the course participants' experiences and knowledge are made visible and developed. This means, for example, that we have an inclusive approach and strive for no one to feel excluded. This can be expressed in different ways in a course, for example by using the gender neutral example.

Required Reading and Additional Study Material

Required reading:

- Aigner, Wolfgang, Miksch, Silvia, Schumann, Heidrun och Tominski, Christian, *Visualization of Time-Oriented Data*, Springer, latest edition. Pages: 80 of 286.
- Kerren, Andreas, Ebert, Achim och Meyer, Jörg, *Human-Centered Visualization Environments*. LNCS Tutorial 4417, Springer, 2007, ISBN 978-3-540-71948-9. Pages: 150 of 403.
- Ward, Matthew, Grinstein, Georges G. och Keim, Daniel, *Interactive Data Visualization - Foundations, Techniques, and Applications*, A. K. Peters Ltd., latest edition. Pages: 150 of 558.